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Mazdoor Kisan Shakti Sangathan
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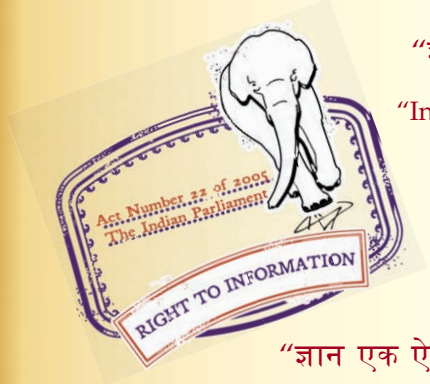
Jawaharlal Nehru
"Step Out From the Old to the New"

IS 8035 (1999): Handpump - Shallow Well [MED 27: Handpumps]



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"ज्ञान एक ऐसा खजाना है जो कभी चुराया नहीं जा सकता है"
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"Knowledge is such a treasure which cannot be stolen"

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IS 8035 : 1999
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हथ बरमे – उथला कुँआ – विशिष्टि
(पहला पुनरीक्षण)

Indian Standard

HANDPUMP — SHALLOW WELL — SPECIFICATION
(First Revision)

ICS 23.080

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BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

April 1999

Price Group 9

FOREWORD

This Indian Standard (First Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Handpump Sectional Committee had been approved by the He vy Mechanical Engineering Division Council.

This standard was published in 1976. Since the success of deepwell handpumps covering the areas with static water level between 20 m to 50 m, efforts have been made to improve the design of shallow well handpump to provide drinking water in the area where static water level remains within the suction limit. The outcome of such efforts is a more dependable and maintainable shallow well handpump, covered in this standard, drawing upon the strengths of existing designs and field tests by national and international bodies concerned with rural drinking water supply programmes in India.

An important feature of this revision is inclusion of dimensional and constructional details so as to adopt a standard design for quality control, interchangeability and easy availability of the components.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated , expressing the result of a test, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off values should be the same as that of the specified value in the standard.

Indian Standard

HANDPUMP — SHALLOW WELL — SPECIFICATION

(First Revision)

1 SCOPE

This standard covers handpumps for lifting water from wells having static water level not exceeding 7 m below ground level.

2 REFERENCES

The Indian Standards listed in Annex A contain povisions which through reference in this text, constitute provision of this standard.At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated in Annex A.

3 NOMENCLATURE

A brief description of the main pump components is given below (*see* Fig.1):

a) *Body* — A housing to contain plunger which provides the suction action.

b) *Head* — A pivot support for handle which operates the plunger.

c) *Base* — A base to support the body, housing the check valve and providing a mounting for the pump on its foundation.

d) *Plunger* — The main pumping element.

4 GENERAL REQUIREMENTS

4.1 The material, dimensions and tolerances, etc, shall be as given in Fig. 1 to 10.

4.1.1 Unless otherwise specified, the tolerance on the unmachined dimensions related to the rolled carbon steel plate/sheet and the bright bars, used in the pump production, shall be as given in IS 1852 and IS 9550 respectively.

4.1.2 For unmachined dimensions of the castings, where tolerances are not indicated, the deviations specified in Class 1 of IS 5519 shall be applicable.

4.1.3 For all other linear/angular dimensions where tolerances are not specified (including fillet radii and chamfer height) the tolerance as per Class 'm' (medium) of IS 2102 (Part 1) will be followed for the manufacturing of the components. However, as also stated in **6** of the standard, any deviation on such dimensions, observed during the inspection of the final product, shall not lead to automatic rejection unless it affects the performance of the component in the assembly it is part of.

4.1.4 Unless otherwise specified, the C.I. castings shall have all edges rounded off and corners filleted to 3 mm radius. All sharp corners of other components shall also be rounded off.

4.2 The castings shall conform to Grade FG 200 of IS 210.

4.2.1 The castings shall be sound, clean and free from porosity, blowholes, hard spots, cold shuts, distortion and harmful defects. They shall be well dressed and fettled.

4.2.2 The castings shall not be repaired or welded.

4.2.3 The bore of the body shall have a smooth surface. While machining, the ovality and waviness of the bore of the body shall be within the tolerances given in this standard.

4.2.4 The top and bottom surfaces of the body shall be parallel to each other and perpendicular to its vertical axis.

4.2.5 Threads in the base for attaching the suction pipe shall be perpendicular to its top face and it shall be ensured during manufacturing.

4.3 Steel plates/sheets and rounds shall conform to Grade A of IS 2062.

4.4 The plunger rod shall be of 12 mm diameter conforming to bright bar of Type 4 of IS 9550 with mechanical properties as follows:

Tensile strength	540 to 790 MPa, and
Elongation	12 percent, minimum

4.5 The spring washer shall conform to IS 6735.

4.6 Bolts and nuts used for pump assembly shall conform to IS 1363 (Part 1) and IS 1363 (Part 3) respectively.

4.7 High density polyethylene (HDPE) used for the check valve guide shall conform to IS 7328.

4.8 Flexible PVC compound for the cup seal shall conform to IS 9766.

4.9 The circlip shall conform to IS 3075 (Part 1).

4.10 The rubber gasket shall conform to Class 2B Type II of IS 11149.

4.11 The physical properties of nitrile rubber compound shall be as follows:

Shore hardness on Scale A	60^{+5}_{-4}
Tensile strength, *Min*	8.4 MPa
Elongation at break, percent, *Min*	400 percent
Compression set, 24 h at 70°C, *Max*	30 percent
Volume change, 22 h at 40°C	+25 percent 0 percent

5 ANTI-CORROSIVE TREATMENT

The components of the pump shall be given anti-corrosive treatment as given below.

5.1 Electrogalvanising

5.1.1 The following shall be electrogalvanised and passivated as per service condition No. 4 of IS 1573. The components shall be flattened/straightened, as and where applicable, and deburred before plating:

a) Plunger rod,
b) Threaded bush,
c) Follower plate,
d) Plunger plate,
e) Fulcrum pin, and
f) Plunger pin.

5.1.2 All bolts, nuts, washers shall be electro-galvanised and passivated as per IS 1367 (Part 11).

5.2 Galvanising

5.2.1 The following parts shall be hot dip galvanised according to IS 4759:

i) Check valve weight, and
ii) Sliding plate.

5.2.2 The galvanised components shall be given chromate conversion coating according to **5.9** of IS 2629.

5.3 Painting

The exterior surfaces of cast iron components shall be given the following treatment:

a) One coat of red oxide primer conforming to IS 2074.
b) Two coats of synthetic enamel paint conforming to IS 2932.

NOTE — The colour of paint may be as agreed between manufacturer and purchaser.

6 TESTING

6.1 Visual Tests

6.1.1 All the pumps shall be examined for workmanship, finish and visual defects.

6.2 Dimensional and Other Tests

6.2.1 *Sampling*

Unless otherwise specified in the contract or order, the procedure given in IS 2500 (Part1) shall be followed for sampling inspection. For the characteristics given under **6.2**, the single sampling plan with general inspection level I and AQL of one percent as given in Table I and II A of IS 2500 (Part 1) shall be followed.

6.2.1.1 Samples shall be drawn from the pumps conforming to the requirements given in **6.1**.

6.2.2 All assemblies and parts shall be checked for interchangeability.

6.2.3 The plunger rod shall be examined for straightness and thread formation.

6.2.4 The handle shall be checked for free up and down movement.

6.2.5 The stroke of the pump shall be 220 ± 7 mm.

6.2.6 The bore of the body shall be checked for smoothness and ovality as per requirements of **4.2.3**.

6.2.7 When checked with the check valve in place, there shall be no leakage from the valve and/or between the base and the body.

6.2.8 When checked by moving the handle up and down, there shall be no rubbing between the plunger rod and head cover slot.

6.2.9 The head cover shall fit properly on the body in all four positions.

6.2.10 Seating of the body on the base shall be proper and without any tilt.

6.2.11 The matching of flange holes shall be checked for ensuring the unrestricted insertion of the bolts.

6.2.12 A ø 89 ± 0.2 × 300 mm long hollow mandrel, fixed at right angle to a smooth machined ø 130 × 12 mm plate will be made to slide into the bore of the body so that the plate rest on the flange. 1mm feeler gauge shall not pass through the gap between the plate and the flange. This check will be done on both the ends of the body.

6.3 Routine Test

Two complete pumps out of the pumps selected according to **6.2.1** shall be subjected to the following tests in addition to the tests in **6.2**.

6.3.1 The pumps shall be dismantled completely and shall be checked for critical dimensions of its assemblies and individual components.

6.3.2 The bodies shall be subjected to hydrostatic test at a pressure of 0.2 MN/m^2 (approx. 2 kgf/cm^2).

6.3.3 Two pumps, other than those selected for dimensional check, shall be mounted, by means of some suitable arrangement, over a barrel of 200 litres water capacity. The pump shall then be primed and test shall start only after getting continuous flow of water. The water shall then be collected in a container for 20 continuous strokes and the discharge thus measured shall not be less than 20 litres.

6.4 Criteria of Conformity

The lot shall be conforming to the requirements of this standard if the pumps selected according to **6.2.1** and **6.3** satisfy the following requirements.

The number of pumps not meeting the requirements of the characteristics inspected under **6.2** does not exceed the corresponding acceptance number specified in IS 2500 (Part 1).

The pumps selected according to **6.3** meet the requirements as given in **6.3.1** to **6.3.3**.

7 GUARANTEE

The pump and accessories shall be guaranteed for 12 months from the date of installation or 18 months from the date of supply, whichever is earlier, against bad workmanship/defective material.

8 MARKING

8.1 The manufacturer's identification with year of manufacturing shall be marked in raised letters on the body, head cover, handle and base. The serial number shall be marked on the body by steel punch.

8.2 Standard Marking

8.2.1 The shallow well hand pump may also be marked with BIS Standard Mark.

8.2.2 The use of Standard Mark is governed by the provisions of *Bureau of Indian Standards Act*, 1986 and Rules and Regulations made thereunder. The details of conditions under which the license for use of Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

9 PACKING

9.1 Unless otherwise specified in the contract or order, the packing shall be as follows.

9.1.1 Before packing, the pump shall be assembled properly and covered with polyethylene bags. It shall then be covered with straw rope and hessian cover.

9.1.2 If the pump is to be dispatched without assembly, then each part shall be individually covered with polyethylene bag and subsequently packed in a suitable box of appropriate size. The size of the box may be selected depending upon the quantity of parts to be packed in such a way that its gross weight does not exceed 50 kg.

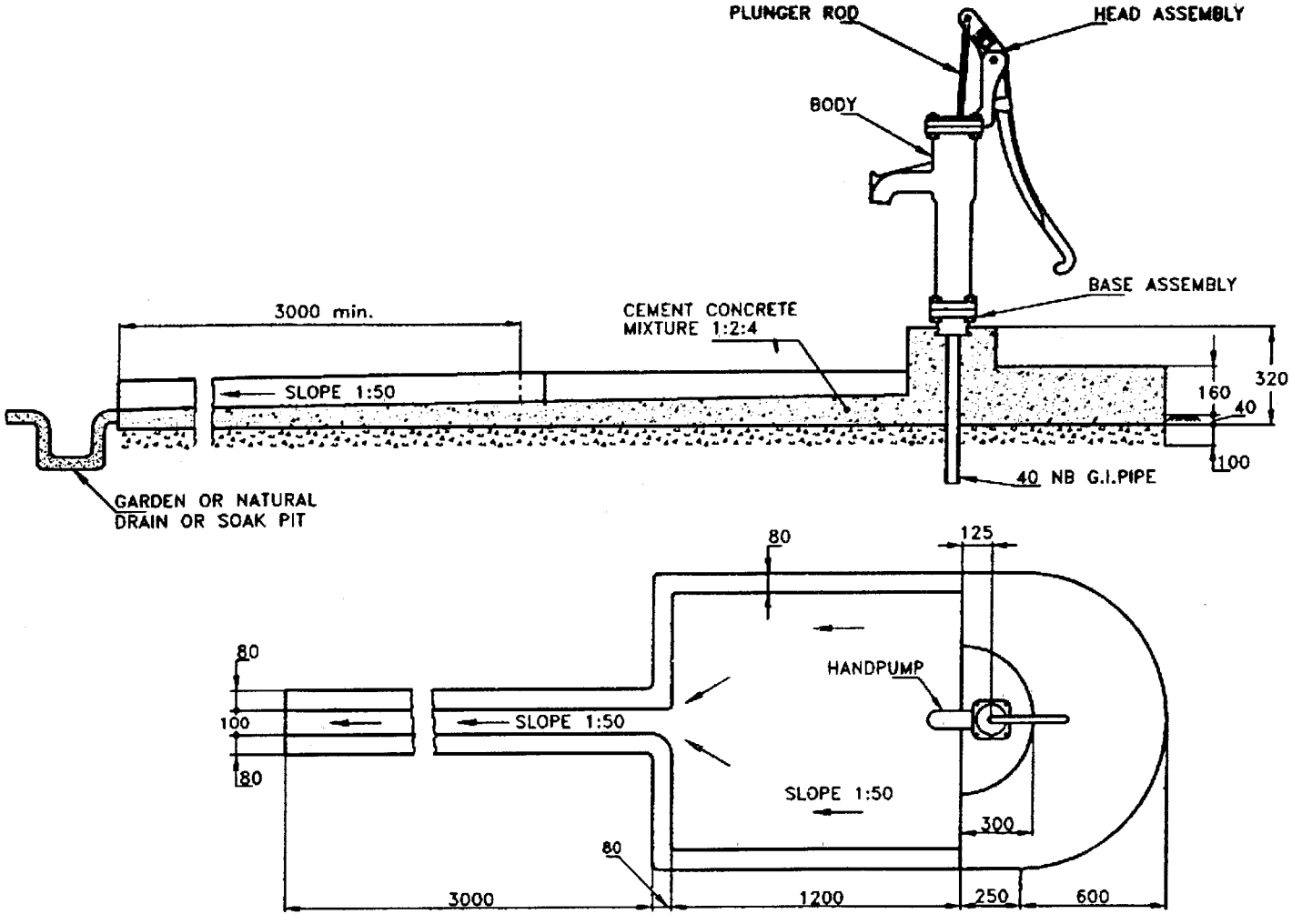
9.1.3 The exposed threads shall be suitably protected against rusting and damage in transit/storage.

ANNEX A

(*Clause* 2)

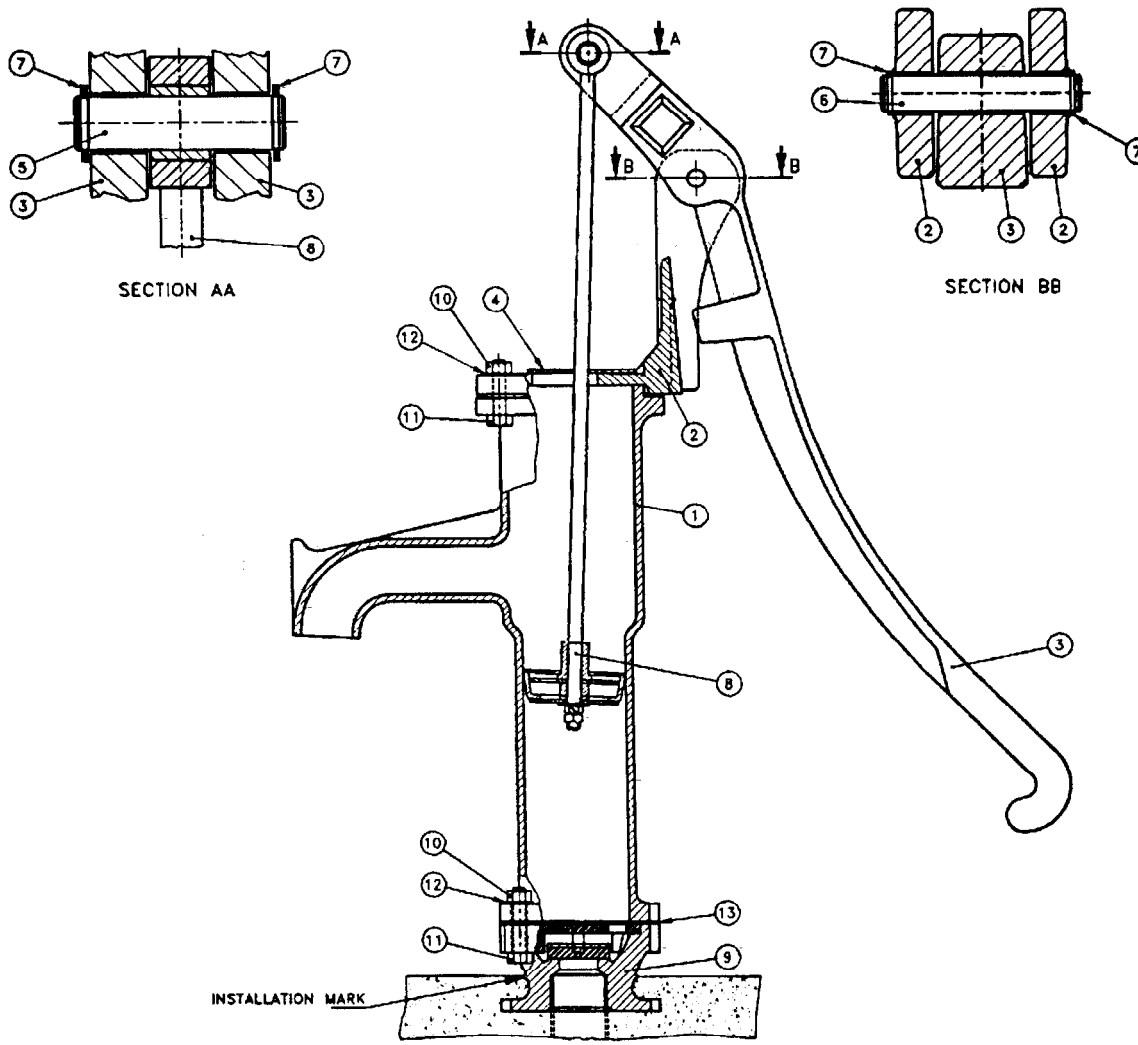
LIST OF REFERRED INDIAN STANDARDS

IS No.	*Title*
210 : 1993	Grey iron castings (*fourth revision*)
1363	Hexagon head bolts, screws and nuts of product grade C:
(Part 1) : 1992	Hexagon head bolts (size range M5 to M64) (*third revision*)
(Part 2) : 1992	Hexagon head screws (size range M5 to M64) (*third revision*)
(Part 3) : 1992	Hexagon nuts (size range M5 to M64) (*third revision*)
1367 (Part 11) : 1996	Technical supply conditions for threaded steel fasteners: Part 11 Electroplated coatings
1573 : 1986	Electroplated coatings of zinc on iron and steel (*second revision*)
1852 : 1985	Rolling and cutting tolerances for hot rolled steel products (*fourth revision*)
1875 : 1992	Carbon steel billets, blooms, slabs and bars for forgings (*fifth revision*)
2062 : 1992	Steel for general structural purposes (*fourth revision*)
2074 : 1992	Ready mixed paint, air drying, red oxide, zinc chrome priming (*second revision*)
2102 (Part 1) : 1993	General tolerances: Part 1 Tolerances for linear and angular dimensions without individual tolerance indications (*third revision*)
2500 (Part 1) : 1992	Sampling inspection procedure: Part 1 Attributes sampling plans indexed by acceptable quality level (AQL) for lot-by-lot inspection (*second revision*)
2629 : 1985	Recommended practice for hot dip galvanising on iron and steel (*first revision*)
2932 : 1993	Enamel, synthetic, exterior (a) undercoating, (b) finishing (*second revision*)
3075 (Part 1) : 1986	Dimensions for circlips: Part 1 For shafts (*first revision*)
4759 : 1996	Hot dip zinc coatings on structural steel and other allied products (*second revision*)
5519 : 1979	Deviations for untoleranced dimensions and mass of grey castings (*first revision*)
6735 : 1994	Fasteners — Spring lock washers for screws with cylindrical heads (*first revision*)
7328 : 1992	High density polyethylene materials for moulding and extrusion
9550 : 1980	Bright bars
9766 : 1992	Flexible PVC compounds
11149 : 1984	Rubber gaskets



All dimensions in millimetres.

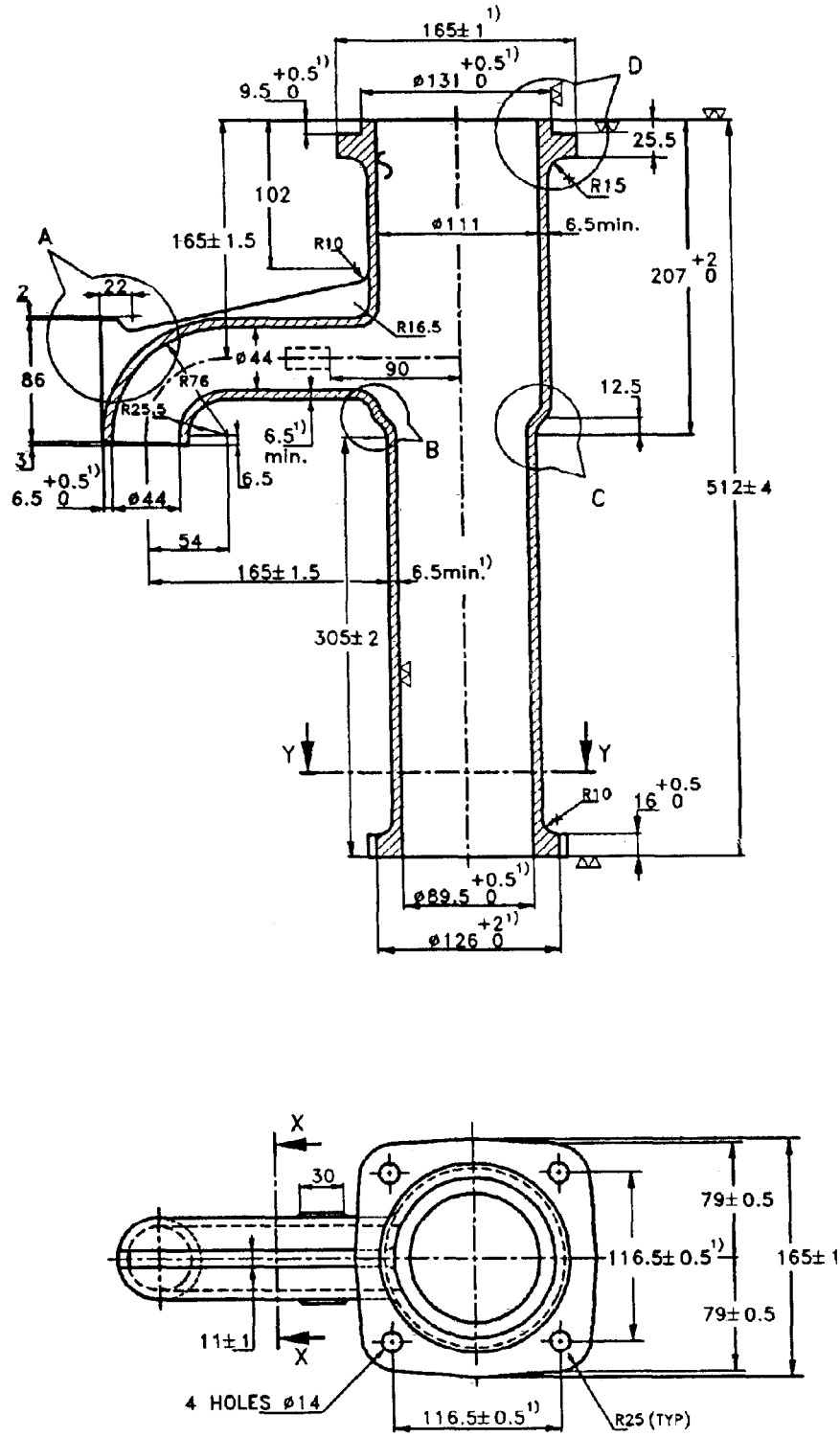
FIG. 1 TYPICAL SETUP FOR SHALLOW WELL HANDPUMP



NOTE— Base to be embedded in cement concrete up to installation mark.

PART NO.	NO. OFF	DESCRIPTION	MATERIAL
13	1	Rubber Gasket	Class 2B, Type II of IS 11149
12	9	Spring Washer for M12 bolt	IS 6735
11	8	Hex. Bolt M 12×1.75 – 65 mm long	IS 1363 (Part 2)
10	9	Hex. Nut M12×1.75	IS 1363 (Part 3)
9	1	Base Assembly	—
8	1	Plunger Assembly	—
7	4	Circlip for 16 Outer Dia Shaft	IS 3075 (Part 1)
6	1	Fulcrum Pin	Type 0, Grade 2 of IS 9550
5	1	Plunger Pin	do
4	1	Sliding Plate	Grade A of IS 2062
3	1	Handle	Grade FG 200 of IS 210
2	1	Head	do
1	1	Body	do

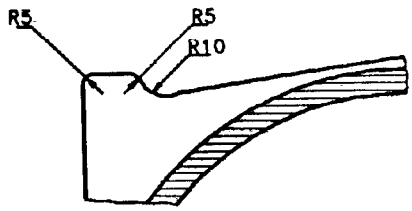
FIG. 2 PUMP ASSEMBLY



1) Indicates critical dimensions.

All dimensions in millimetres.

FIG. 3 BODY (*Continued*)



DETAIL AT A
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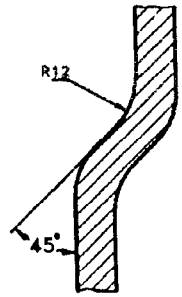
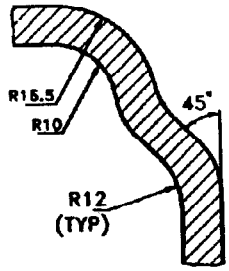
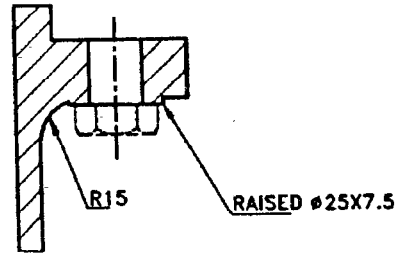


DETAIL AT C
(ENLARGED)



DETAIL AT B
(ENLARGED)



DETAIL AT D
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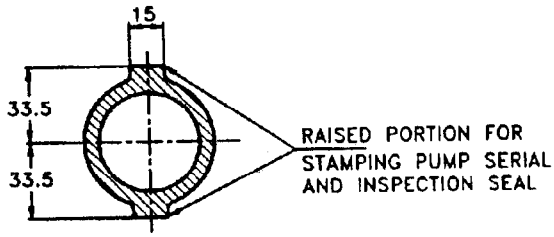

SECTION XX
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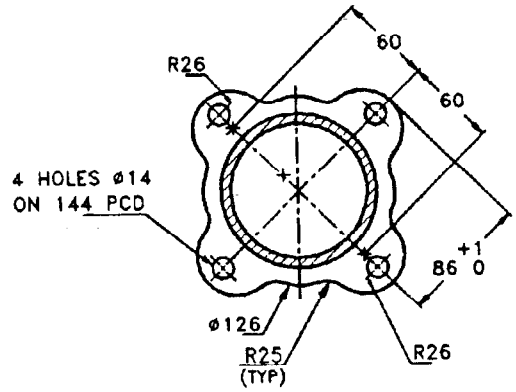
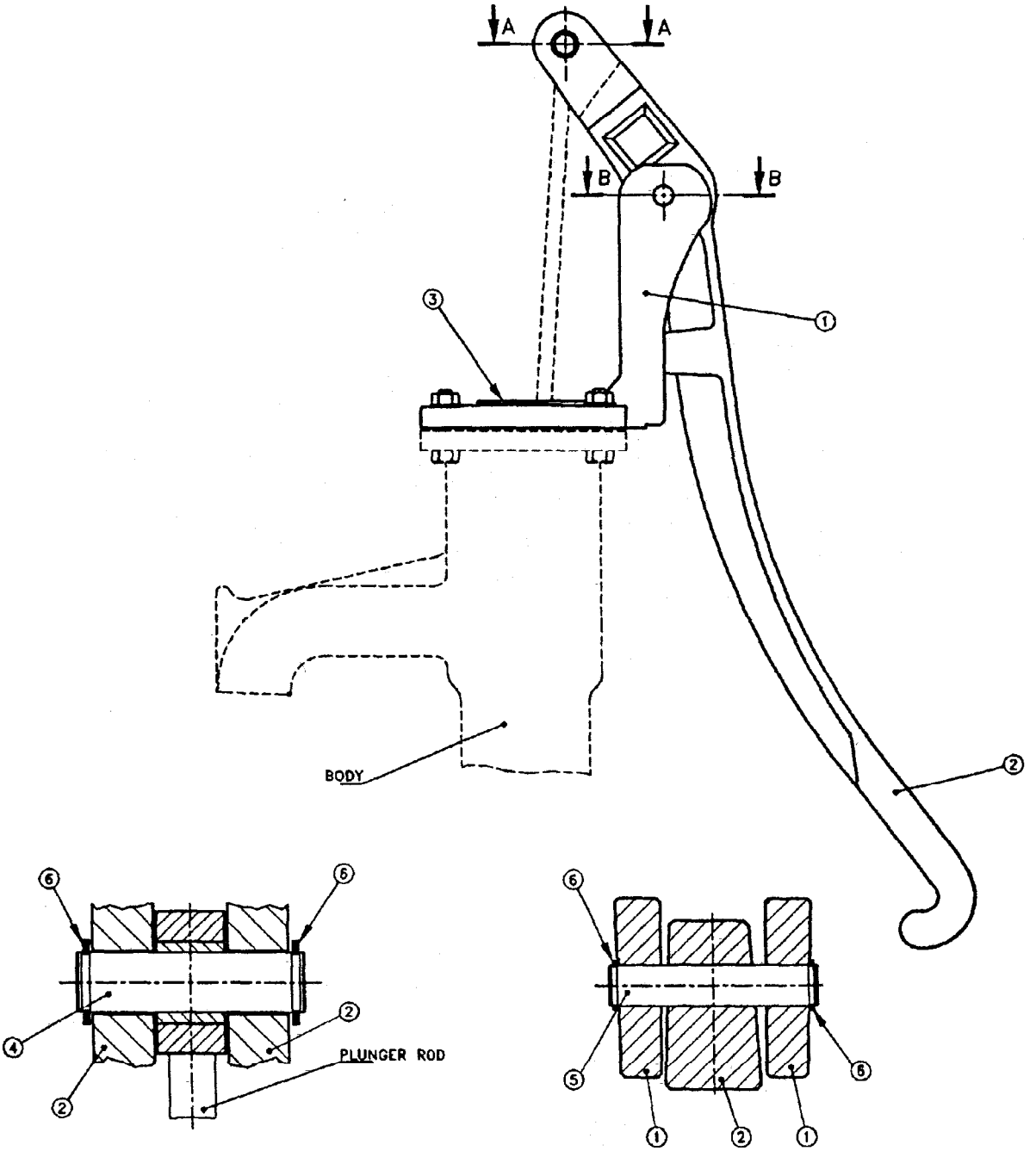


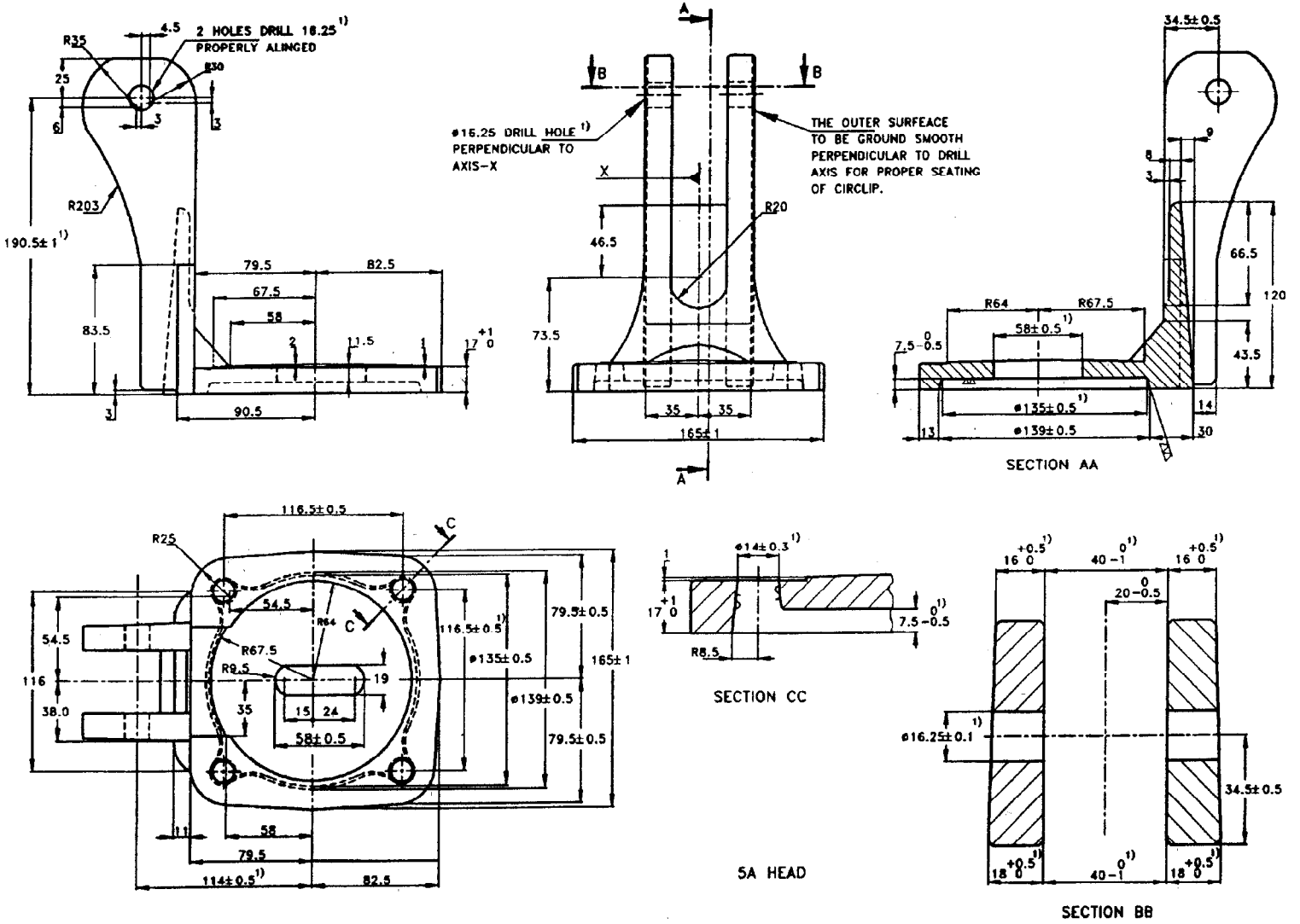
SECTION YY

FIG. 3 BODY



PART NO.	NO. OFF	DESCRIPTION	MATERIAL
6	4	Circlip for 16 Outer Dia Shaft	IS 3075 (Part 1)
5	1	Fulcrum Pin	Type 0, Grade 2 of IS 9550
4	1	Plunger Pin	do
3	1	Sliding Plate	Grade A of IS 2062
2	1	Handle	Grade FG 200 of IS 210
1	1	Head	do

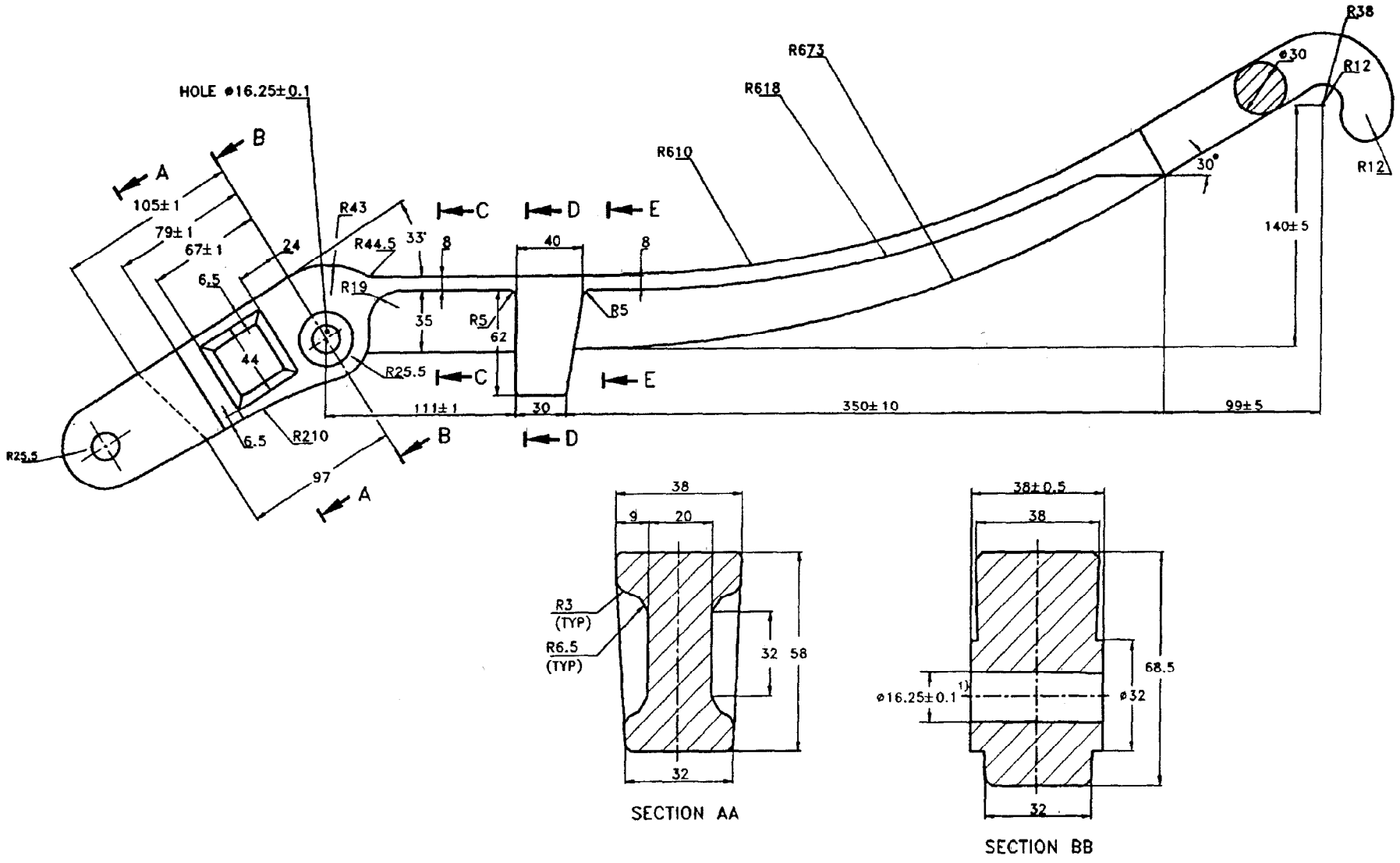
FIG. 4 HEAD ASSEMBLY



1) Indicates critical dimensions.

All dimensions in millimetres.

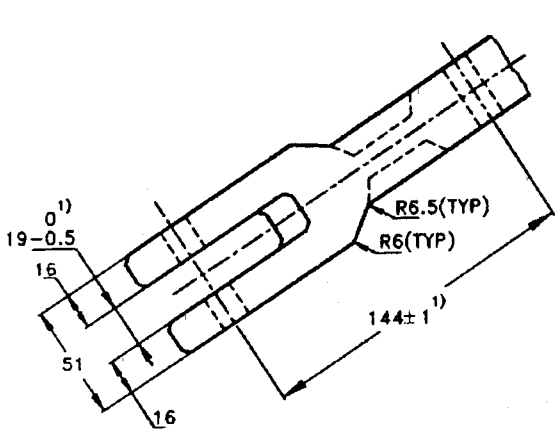
FIG. 5 HEAD ASSEMBLY PARTS (*Continued*)

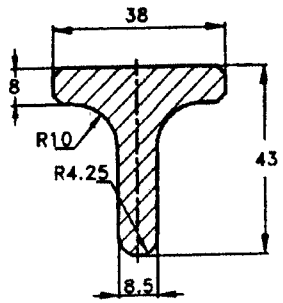


1) Indicates critical dimensions.

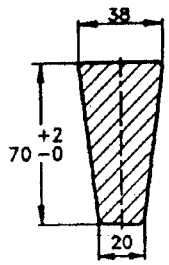
All dimensions in millimetres.

FIG. 5 HEAD ASSEMBLY PARTS (*Continued*)

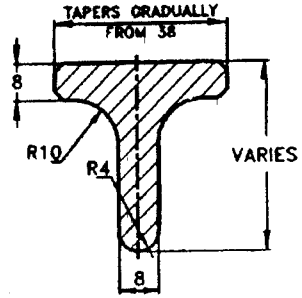




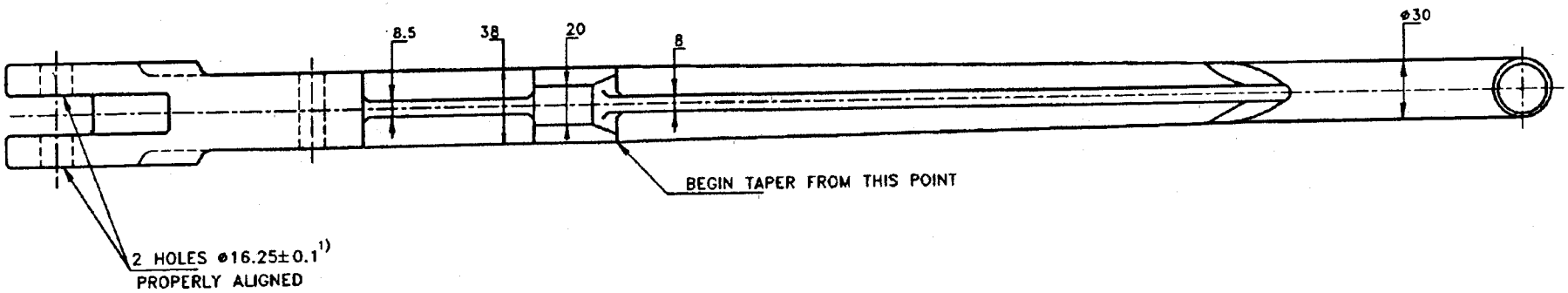
SECTION CC



SECTION DD



SECTION EE



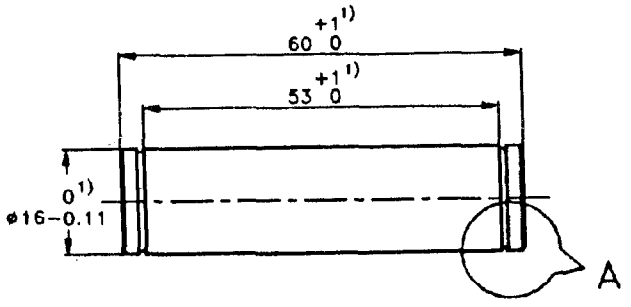
5B HANDLE

NOTE — Concentricity of hole (Ø 16.5) with respect to boss (Ø 32) shown in Section BB shall not be insisted upon unless otherwise specifically mentioned.

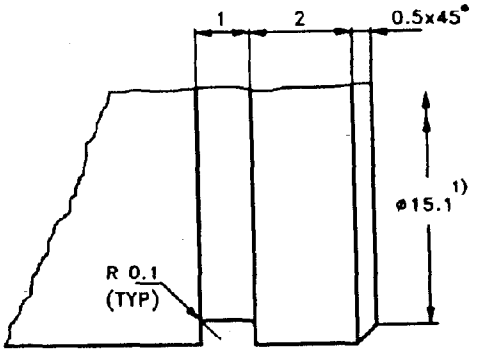
1) Indicates critical dimensions.

All dimensions in millimetres.

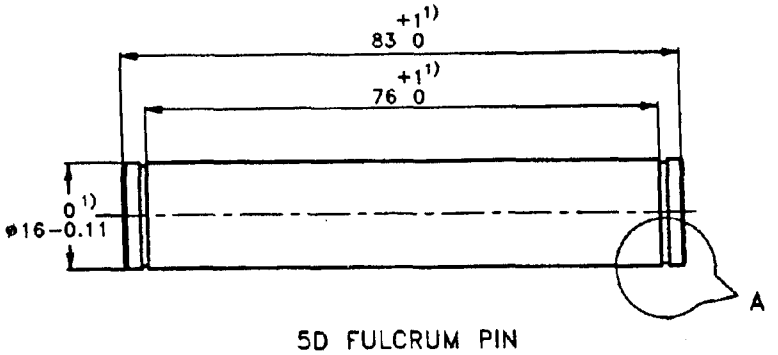
FIG. 5 HEAD ASSEMBLY PARTS (*Continued*)



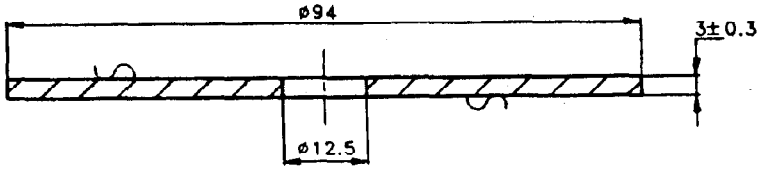
5C PLUNGER PIN



DETAIL AT A



5D FULCRUM PIN

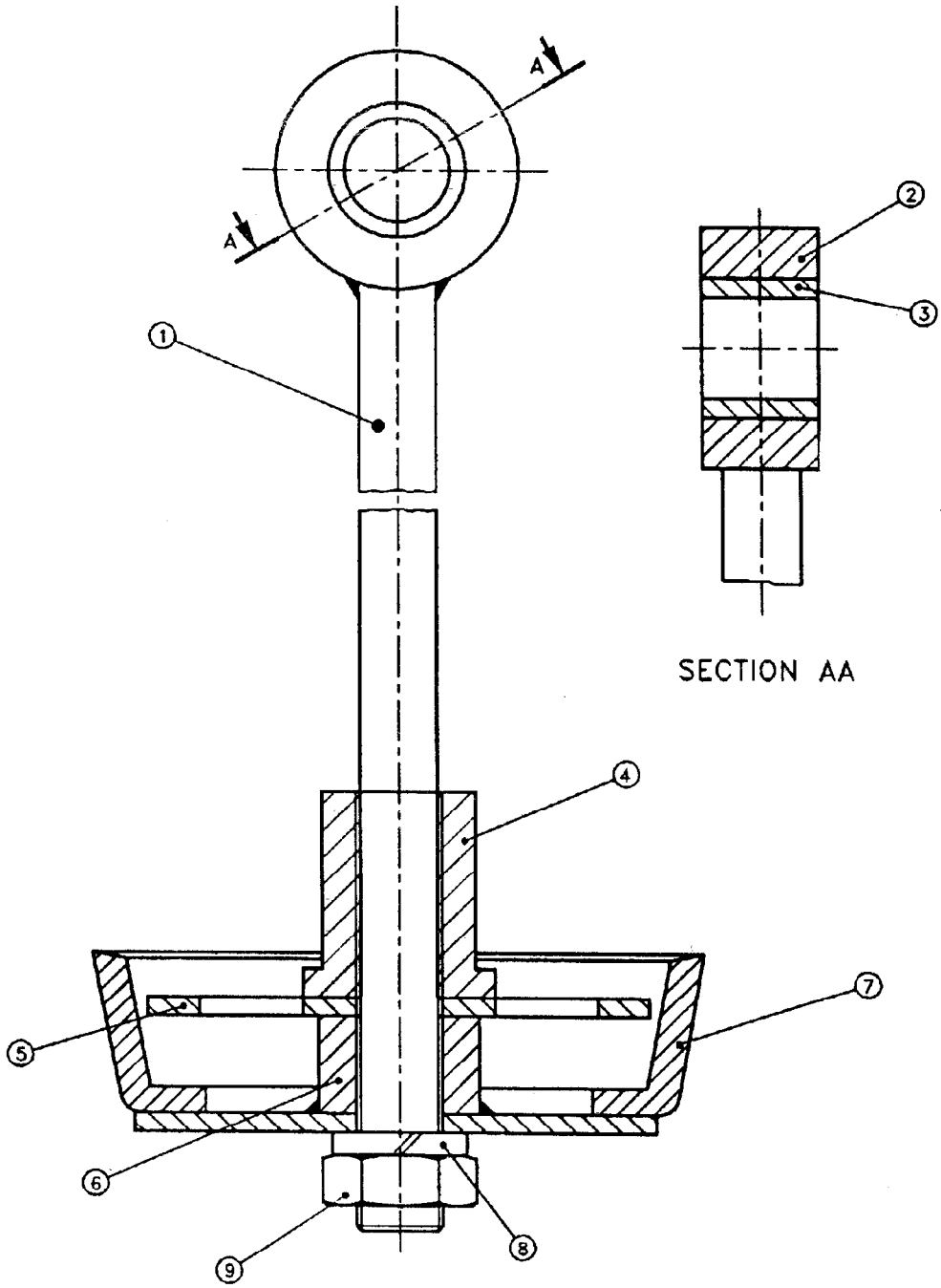


5E SLIDING PLATE

1) Indicates critical dimensions.

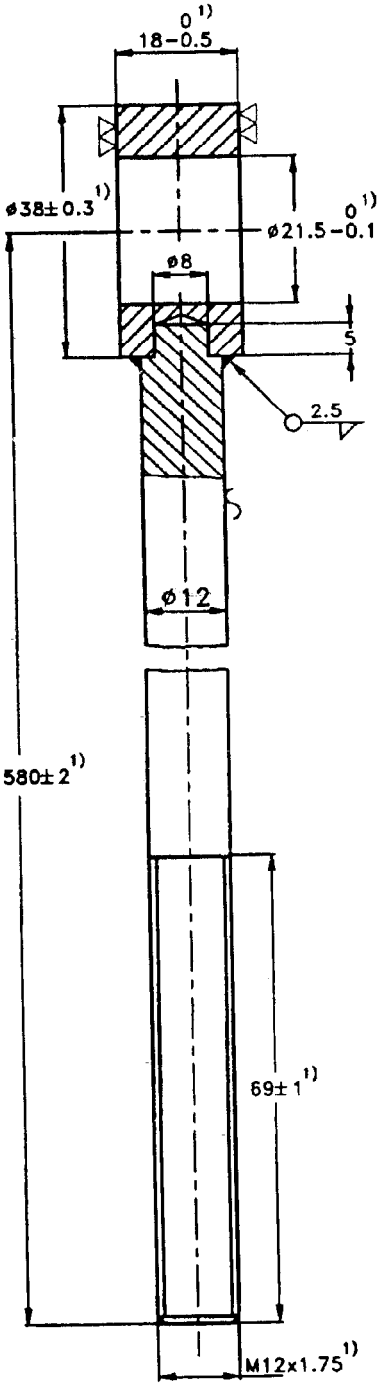
All dimensions in millimetres.

FIG. 5 HEAD ASSEMBLY PARTS

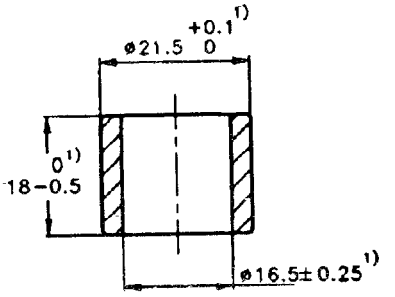


PART NO.	NO. OFF	DESCRIPTION	MATERIAL
1	1	Plunger Rod	Type 4, Grade 2 of IS 9550
2	1	Eye	Grade A of IS 2062
3	1	Hardened Steel Bush	Grade 4 of IS 1875
4	1	Threaded Bush	do
5	1	Plunger Plate	do
6	1	Follower Plate	Grade A of IS 2062
7	1	Cup Seal	IS 9766 (Hardness 85 Shore A)
8	1	Spring Washer for M12 Bolt	IS 6735
9	1	Hex. Nut M12 x 1.75	IS 1363 (Part 3)

FIG. 6 PLUNGER ASSEMBLY

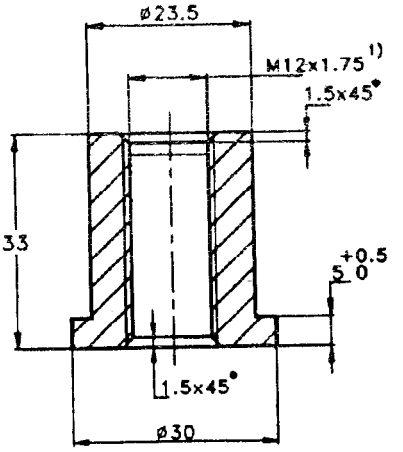


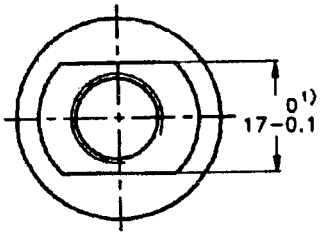
7A PLUNGER ROD WITH EYE



HARDENED TO HRC 35–40

7B HARDENED STEEL BUSH



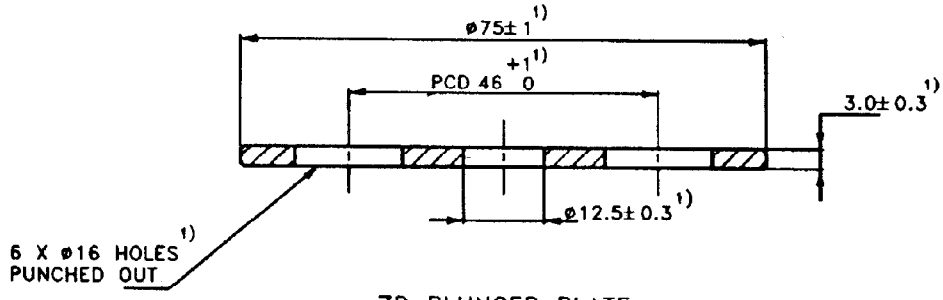


7C THREADED BUSH

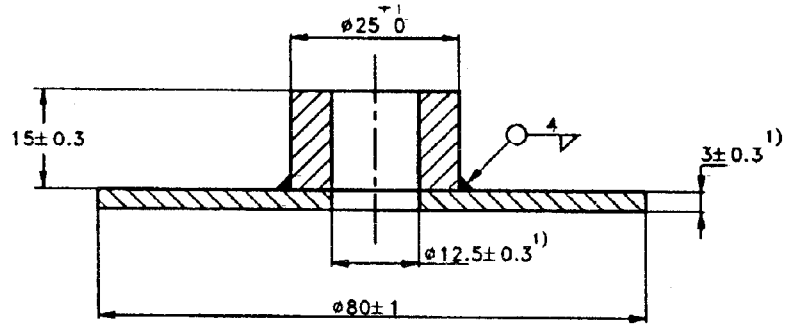
1) Indicates critical dimensions.

All dimensions in millimetres.

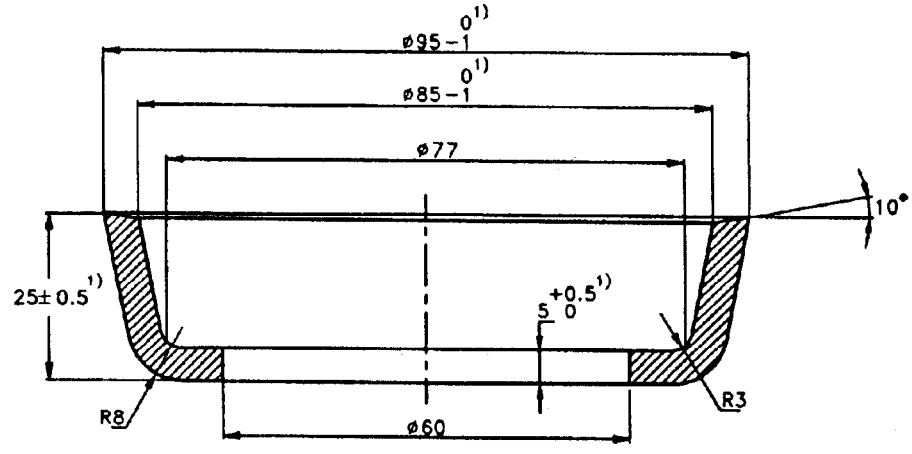
FIG. 7 PLUNGER ASSEMBLY PARTS (*Continued*)



7D PLUNGER PLATE



7E FOLLOWER PLATE



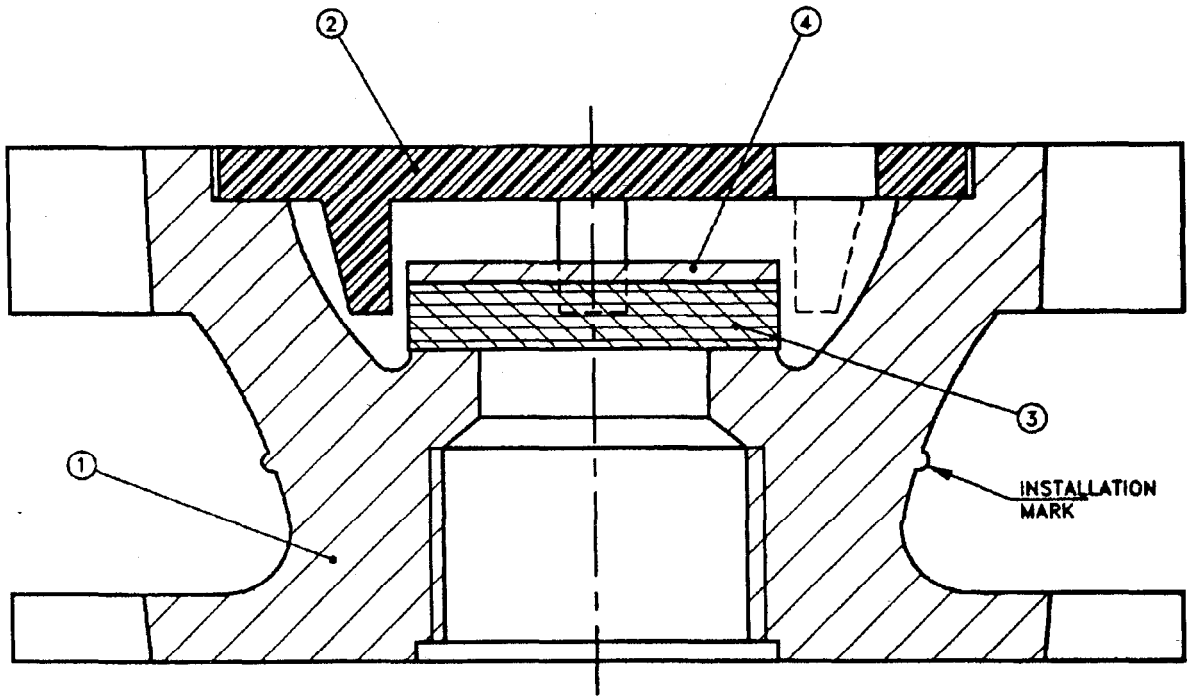
HARDNESS: SHORE A 85±5

7F CUP SEAL

1) Indicates critical dimensions.

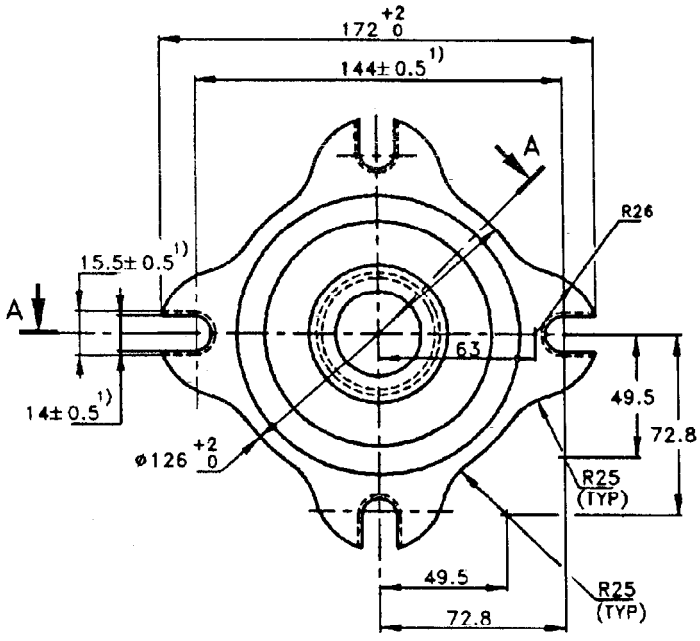
All dimensions in millimetres.

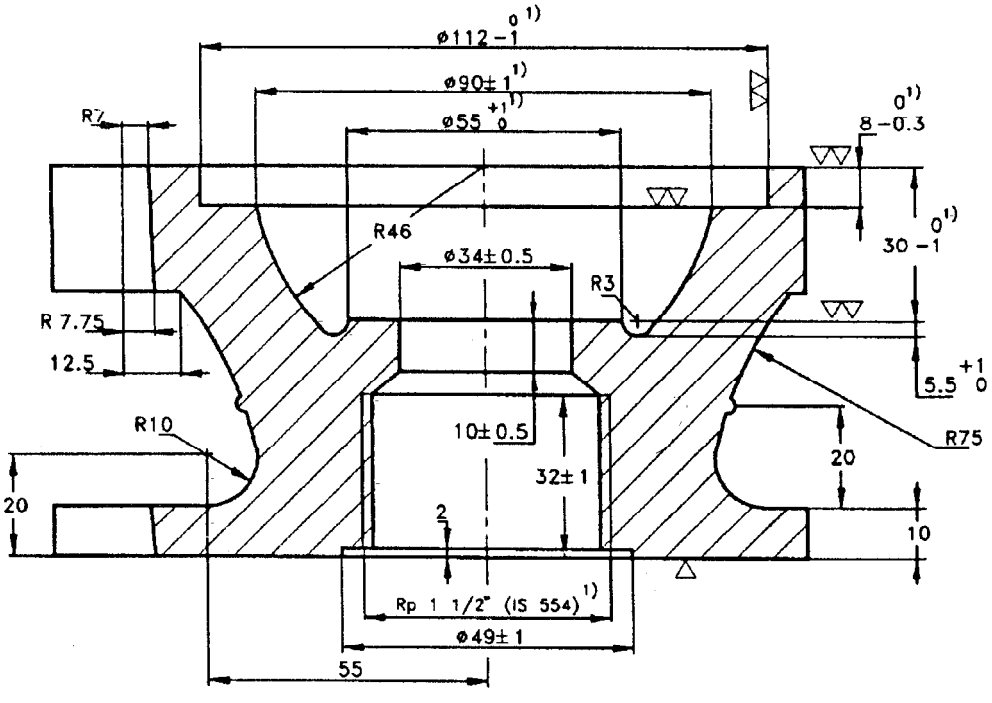
FIG. 7 PLUNGER ASSEMBLY PARTS



PART NO.	NO. OFF	DESCRIPTION	MATERIAL
4	1	Check Valve Weight	Grade A of IS 2062
3	1	Check Valve	Nitrile Rubber (Hardness 60 Shore A)
2	1	Check Valve Guide	IS 7328
1	1	BASE	Grade FG 200 of IS 210

FIG. 8 BASE ASSEMBLY





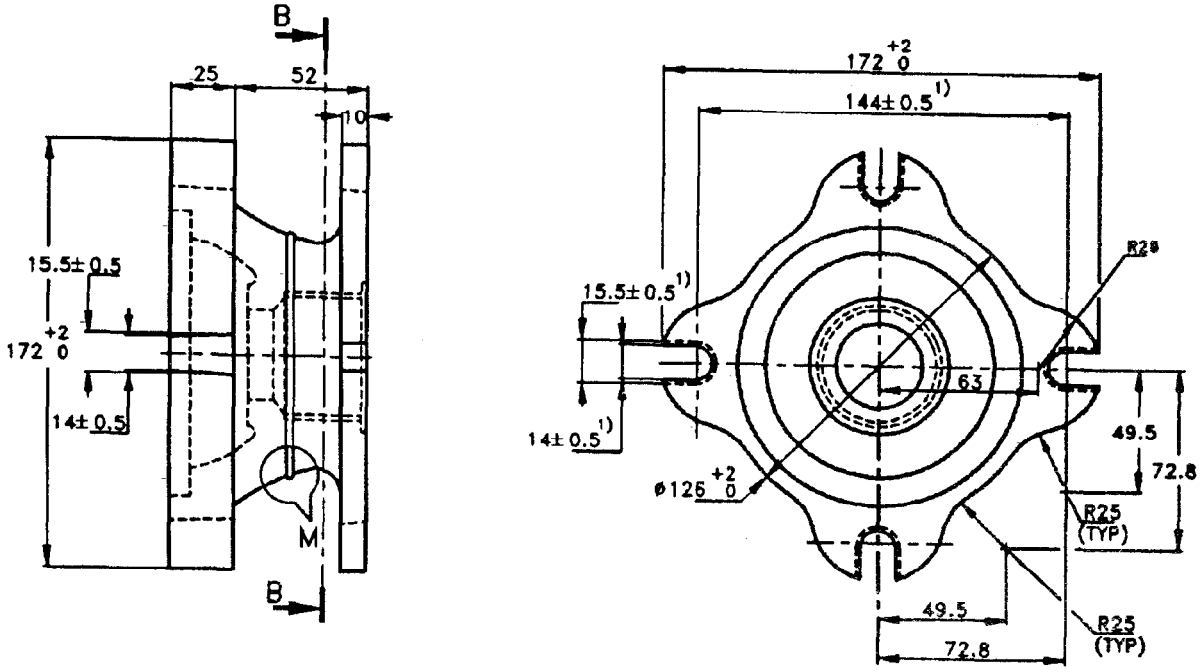
SECTION AA
(ENLARGED)

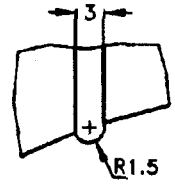
9A BASE

1) Indicates critical dimensions.

All dimensions in millimetres.

FIG. 9 BASE ASSEMBLY PARTS (*Continued*)

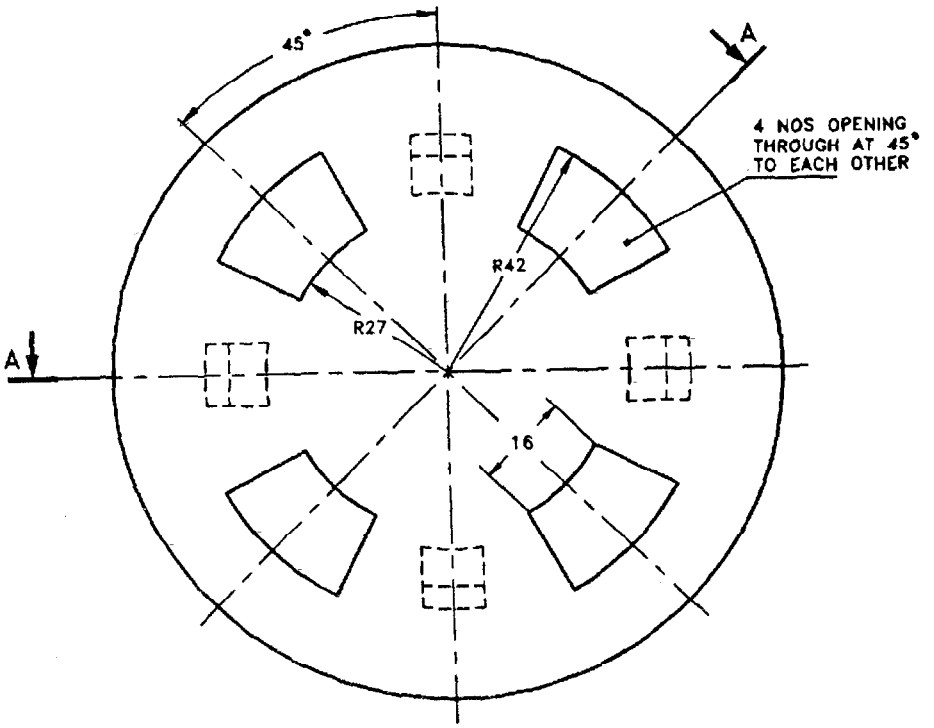


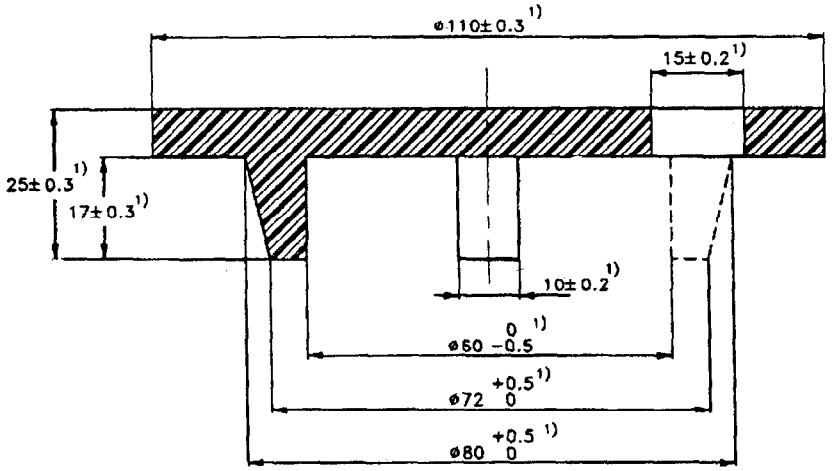


1) Indicates critical dimensions.

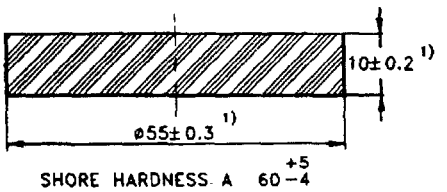
All dimensions in millimetres.

FIG. 9 BASE ASSEMBLY PARTS (*Continued*)

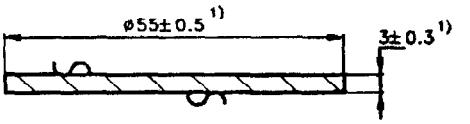




9B CHECK VALVE GUIDE



9C CHECK VALVE

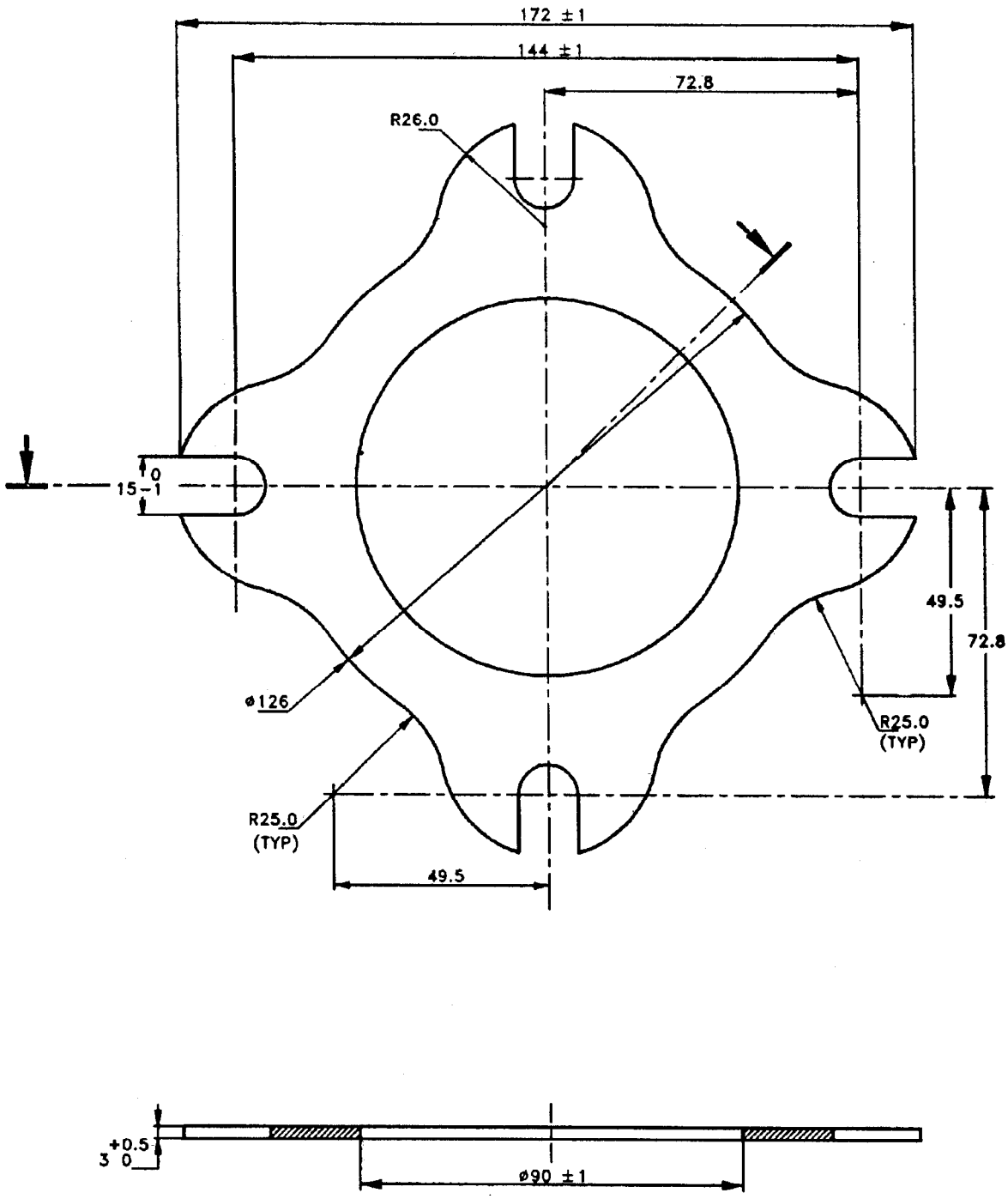


9D CHECK VALVE WEIGHT

1) Indicates critical dimensions.

All dimensions in millimetres.

FIG. 9 BASE ASSEMBLY PARTS



All dimensions in millimetres.

FIG. 10 RUBBER GASKET

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